B:11 Troskoski

Unclassified

Uranium Enrichment Facilities United States Enrichment Corporation

ENGINEERING NOTICE

Sheet 1 of 1

(Attach Additional Sheets as necessary)

Facilities: Plantwide	EN - C - 822 - 02- 036 Rev 1 Plant Discipline Year Seq Number
Reason for EN: Operability Evaluation for the Hunt Valve 1" UF_6 Valve	
Reference(s): ANSI N14.1	
Subject: UF_6 Valve Operability Evaluation	

CAUTION: *This Engineering Notice cannot be used in lieu of formally approved procedures or instructions where such procedures are required by plant policy or procedures.*

Description: The attached operability evaluation finds Hunt UF_6 valves are operable. Valve HV-40 is nonconforming.

Attachment: Operability Evaluation for the Hunt Valve 1" UF_6 Valve

Distribution:
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Responsible Engineering/Designer: Walter Whinnery	Date: 1/8/03
Technical Reviewer: (for Q, AQ-NCS, AQ items)	Date: 01/08/03
Group/Section Manager:	Date: 1/8/03

CP-21087
(9/27/99)

REVIEWED FOR CLASSIFICATION

Initials 1-8-03 Date

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OPERABILITY EVALUATION
UF6 Cylinder Valve Failed Hydrostatic Pressure Test
ATRC-02-5572

Operability Evaluation Number: OE-C-822-02-006, Rev. 1 Initial Issue Identified: 12-16-02 1300
Initial Evaluation Initiated: 12-17-02 1700
Revision Date: 1-8-2003

ISSUE STATEMENT

A testing program was set up for the Hunt Valves because the NRC has received a claim that the quality control of the processes at Hunt were not followed. A test plan was agreed to between USEC and NRC. A group of 56 valves was to undergo rigorous testing to determine if the allegations are true. One of 56 valves chosen to be tested to verify Hunt Valve's quality showed a leak on a 400 psig hydrostatic test. The issue of this evaluation is cylinder valve HV-40 that failed a 400-psig hydrostatic pressure test.

INTRODUCTION

The UF_6 cylinder valve is a Q and AQ-NCS component that provides a liquid UF_6 boundary and also must be able to withstand the expected pressures of the system. The ANSI N14.1 standard calls for testing the valve at twice its normal working pressure. The maximum pressure rating of a 48X cylinder is 200 psig. The cylinder valve is tested at 400 psig with air while immersed in a vat of water to detect any leaks from the valve. At a 405-psig test pressure there were 1-2 bubbles every 2 to 3 seconds causing the valve not to pass the test. No leakage was observed at test pressures up to 200 psig. Increased cylinder valve testing will determine if a true manufacturing defect is present. Other operability evaluations have been completed on the Hunt Valve concerning the valve stem and packing nut (OE-C-822-02-004 and OE-C-822-02-005).

Additional information has been collected about the potential cause of the leak. The metal-to-metal seat being obstructed by a loose particle of bronze appears to have caused the leak. The Monel valve stem was not polished as had been done in the past. The inside planes of the acme threads on the unpolished Monel stem could have been chafing with the internal threads of the valve body creating the loose particles of bronze. The valves were overtorqued and this could have contributed to the force that created the bronze shavings on the valve stem. Shaving in the valve seat area would be similar to any other foreign material in the seat area under normal use. Once the cylinder valve is connected to a pigtail it is leak rated to less than 5-psia vacuum. Before UF6 transfer occurs the pigtail and valve are pressure tested to at least 40 psig with air or nitrogen to detect any leaks. If either of the leak rate requirements is not satisfied, the cylinder is rejected. Foreign material in the cylinder seat area would cause a leak, grounds for rejecting the cylinder. It is uncertain how long the Monel stem was not being polished, but other valves in the Hunt valve test lot were unpolished. The effect of an unpolished Monel cylinder valve stem is taken into consideration in this operability evaluation.

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REFERENCES

1. USEC-01, *Application for United States Nuclear Regulatory Commission Certification, Paducah Gaseous Diffusion Plant*, Volume 1, *Safety Analysis Report [SAR]*, sections 3.2, 3.4, 3.5, 3.6, 3.7, 3.15, 4.3, 4.4.3.
2. USEC-01, *Application for United States Nuclear Regulatory Commission Certification, Paducah Gaseous Diffusion Plant*, Volume 4, *Technical Safety Requirements [TSRs]*, sections 2.1, 2.2, 2.3.
3. EV-C-814-01-016, Rev. 0, *1-Inch* UF_6 *Cylinder Valves.*
4. Boundary Definition Manual, Group ID 1149, 1150, 1151, 1152.
5. Cylinder Valve HV-40 Inspection, Brain DeNeve, January 8, 2003

PART I: DISCUSSION

1. Discuss what applicable requirements or commitments have been established for the SSC.

The Q safety function of the valve is to contain liquid UF_6. The AQ-NCS safety functions are to contain liquid UF_6 and to withstand the maximum expected system pressure (200 psig). The valves are subject to ANSI N14.1 standards and require that the cylinder valve be subjected to twice the working pressure.

References: 1, 2, 3, 4

2. Determine the effect of the condition on the ability of the SSC to meet any established requirements or commitments.

The pressure in an autoclave is controlled by the autoclave steam pressure control system which controls the steam to 8 psig to achieve a 235-degree temperature. The cylinder fill limits ensure the cylinder is not over pressurized due to expansion of UF6 during autoclave heating. These two barriers prevent excessive pressures from developing in a cylinder. The resulting internal pressure is well below the pressure that the valve is tested at. The pressure condition that the cylinder valve is tested at exceeds what is experienced in the cascade processes.

Cylinders are sent to the cylinder yard at a vacuum and cold pressure checks are required prior to feeding a cylinder. An indication of cylinder valve leakage would be a cylinder at atmospheric pressure in the cylinder yard. Prior to feeding a cylinder the pigtail line to the cylinder is leak rated. If the cylinder fails this test due to a leaking valve then the cylinder valve would not be exposed to the pressures experienced in an autoclave.

While USEC is committed to the requirements of ANSI N14.1 the minor leakage of one valve during a hydrostatic test leak will not cause the valve to not be capable of fulfilling the Q and AQ-NCS safety commitments of containing liquid UF_6.

References: 1, 2, 3

3. Determine the effect of the condition on the ability of the SSC to perform its intended safety function.

The Q safety function of the valve is to contain liquid UF_6. As outlined in question 2 the effects of pigtail leak rating, the autoclave steam pressure control system, and cold pressure checks provide a series of checks to ensure that the UF6 cylinder valve performs its intended safety function of containing liquid UF6.

Because testing has only found a single point where the 400 psig pressure test was not completed successfully the viability of the valve population at PGDP should not be called into question until further test results are obtained. Long-term valve history at the plant has been that the safety function of containing liquid UF6 has been met.

References: 1, 2, 3

4. Discuss any alternate means used to fulfill the intended safety function(s).

The current valves are fulfilling the intended safety function to contain liquid UF6. The most probable outcome of this testing is to extend the statistical sample size to the 95% confidence interval with one defect noted. If all the remaining valves to be tested are acceptable then the 95% confidence interval will be achieved.

Once the cylinder valve is connected to a pigtail it is leak rated to less than 5-psia vacuum. Before UF6 transfer occurs the pigtail and valve are pressure tested to at least 40 psig with air or nitrogen to detect any leaks. If either of the leak rate requirements is not satisfied, the cylinder is rejected and not used until repaired. After feeding, filling or transferring, the valve is closed and before the pigtail is removed the system is purged and leak rated again to detect leaks. In all cases the leak scenario is bounded by existing accident analysis, thus no increased significant safety hazard exists.

Cylinders stored in cylinder yards contain solid UF_6 with a closed valve. Historically, there have been instances of material leakage from cylinder valves located in cylinder yards. Any leakage out of a closed cylinder valve will be very minor and of no safety significance since cylinders containing solid UF_6 are below atmospheric pressure and the UF_6 remains a solid at normal atmospheric conditions. SAR section 4.3.6 states, "In the entire history of the plant there has not been a UF_6 leak greater than 10 lbs from a solid filled cylinder. Based on this experience, no accident involving solid filled cylinders in storage areas which could result in health hazards could be identified."

References: 1, 2, 3, and 5

5. Discuss any compensatory measures used to fulfill the intended safety function(s).

Additional cylinder valve testing will be required to determine the implications of the single hydrostatic test failure.

References: N/A

6. Identify the results of any testing, inspection, or surveillance used as a basis for the recommendation.

The hydrostatic testing of the 56 Hunt Valves is the basis for the recommendation. A single failure on this lot size makes the resulting conclusions indeterminate. A full statistical sample size for the one failure case has to be completed to determine if 95% confidence interval has been achieved.

References: 3 and 5

7. Identify the results of any analysis or calculations used as a basis for the recommendation.

At a 405-psig-test pressure there were 1-2 bubbles every 2 to 3 seconds causing the Hunt Valve HV-40 not to pass the hydrostatic pressure test.

Reference: 5

PART I SUMMARY:

Based on the above discussion, the condition is best described as:

Degraded	_____
Nonconforming	__X__
Both	_____
Neither	_____

PART II: CONCLUSIONS

1. Based on the discussion in Part I, is the SSC capable of performing its intended safety function(s)? YES X NO ___

Basis/Justification:
The cylinder valve is capable of performing its intended safety function, which is to contain liquid UF_6 and withstand the maximum expected system pressure. The cylinder valve is never exposed during normal operation to a situation where 400-psig leak free operation is required. The level of degradation in quality is not quantifiable because testing of the statistical sample subset has not been completed. However, the valves and the pigtail are leak rated prior to using the valve, which gives very good assurance that the valve will not significantly degrade during subsequent usage. The autoclave steam pressure control system and cylinder fill limits ensure the cylinder valve is exposed to pressure that is well below the pressure that the valve is tested at. These systems both are independent of the cylinder valve situation and the SAR Accident Analysis scenarios bound the worse case valve failure mode.

The valve is potentially nonconforming because it is indeterminate whether each valve was tested properly in accordance with ANSI N14.1 by the manufacturer prior to delivery to

USEC. If the overall USEC valve test program shows that there is a 95% confidence level that the cylinder valves are free from manufacturer's defects, this OE will be revised to eliminate the "nonconforming" conclusion.

References: 1, 2, and 5

2. Based on the discussion in Part I and the answer to Part II: Question 1, what is the safest plant configuration? (Include a discussion on the effect of transitional action.)

Basis/Justification:
The Hunt Valve Company 1" cylinder valves can meet their intended safety function. Therefore, the current plant configuration is safe and the system should remain operable.

References: 1, 2, 3

If the answer to Question 1 is no, notify the PSS and continue to Question 3. If the answer to Question 1 is yes, Question 3 may be answered N/A, and no basis statement is required.

PSS Contact by: N/A PSS Contacted on: N/A

3. Is the intended safety function(s) being met by other means? YES ___ NO ___ N/A X

Basis/Justification: N/A

References: N/A

If the answer to Question 3 is yes, a JCO may be requested. If the answer to Question 3 is no, a JCO may not be defendable.

PART III: RECOMMENDATION

Based on the discussion in Part I and the conclusions in Part II, the evaluator recommends that the SSC

X Is declared Operable.

___ Is declared Inoperable.

PART IV: APPROVAL

Evaluator Walter Whinnery Date 1/8/03

Technical Reviewer [signature] Date 01/08/03

Approval, Group Manager [signature] Date 1/8/03